Johnson Space Center Site Visit
IT Infrastructure Integration Program (I^{3}P)

Office of the Chief Information Officer

May 1, 2009

VISION: Integrated, secure, and efficient information technology and solutions that support NASA

Agenda

- Welcome – Jon Symes, Assistant Director, Information Resources
  - Safety and Administrative Remarks
  - Process for Comments and Questions
- I³P Overview – Larry Sweet, JSC CIO & Director, Information Resources
- Site Visit Objectives – Jon Symes
- Center Overview
- Center IT Infrastructure Today
  - End User Environment – Bob Neil, Chief, End User Services Office
  - Communication Environment – Kristin Ingram, Chief, Communication Services Office
  - Data Center Environment – Lynn Vernon, Chief, Applications & Data Systems Office
- Center Tour – Jennifer Mason, Deputy Chief, Business Management & Policy Office

Safety and Administrative Remarks

- Fire exits are the front entrance and side exit doors. In the event of a fire, you must move at least 75ft away from the building.

- Restrooms can be found outside the entrance doors to the auditorium.

- Please adjust all cell phones and pagers to the "Off" or "Vibrate" setting.

- During the tour this afternoon
  - Do not use cell phones or cameras to take pictures. Pictures and charts will be available later on the I^{3}P website (I3P.nasa.gov).
  - Please do not talk to the employees you see working in the tour areas.

Process for Comments and Questions

- Aside from site visit logistics questions, NASA will handle comments and questions as described below.

- Submit comments/questions to http://I3P.nasa.gov [Q/A tab].

- Comments Received by May 20:
  - Sender will receive acknowledgement e-mail.
  - Comments will not be posted online nor to any publicly accessible website but will be considered internally by the government when finalizing the RFP and no response will be provided.

- Questions Received by May 20:
  - Sender will receive acknowledgement e-mail.
  - Questions, in whole, in part, or consolidated with similar questions, will be posted online along with the government's response. Individual and company identifiers will not be used in the online posting.

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I^{3}P Overview: Why I^{3}P?

- NASA's commitment to the strategy of Agency-wide IT services and Agency-wide procurement aligns with:

  − NASA's need for IT security, efficiency, and collaboration for mission support

  − Industry and business best practices

  − New Administration's priorities of effectiveness, efficiency, transparency, participation and collaboration

- What will success look like?

  – Reliable, efficient, secure, and well-managed IT infrastructure that customers rely on

  – Systems seamlessly deployed and used across Centers

  – Investing in the right IT solutions that provide the greatest benefit to the NASA mission

# I³P Overview: Five Procurements Drive NASA's IT Transformation
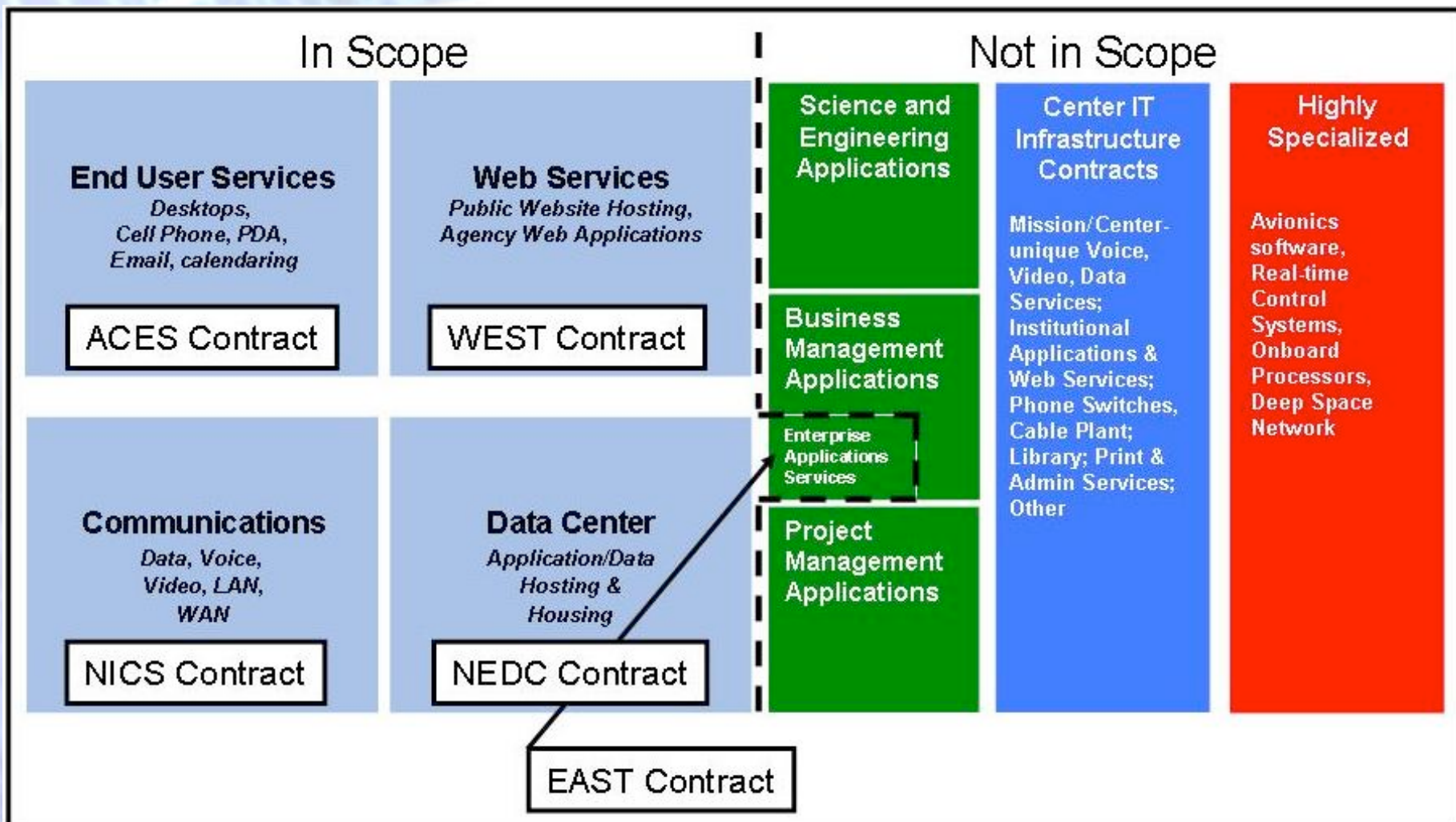
I³P Overview: Agency IT Infrastructure Supports Transformation

- Consolidates and requires Centers to use Agency contracts for core IT infrastructure services
- Allows Centers to use Center specific IT support contracts for Non-I³P services
- Uses a single Enterprise Service Desk and Enterprise Service Request System for reporting/tracking Incidents and for requesting I³P defined services
- Primary purpose is to provide better IT security, collaboration, efficiencies to accomplish NASA mission
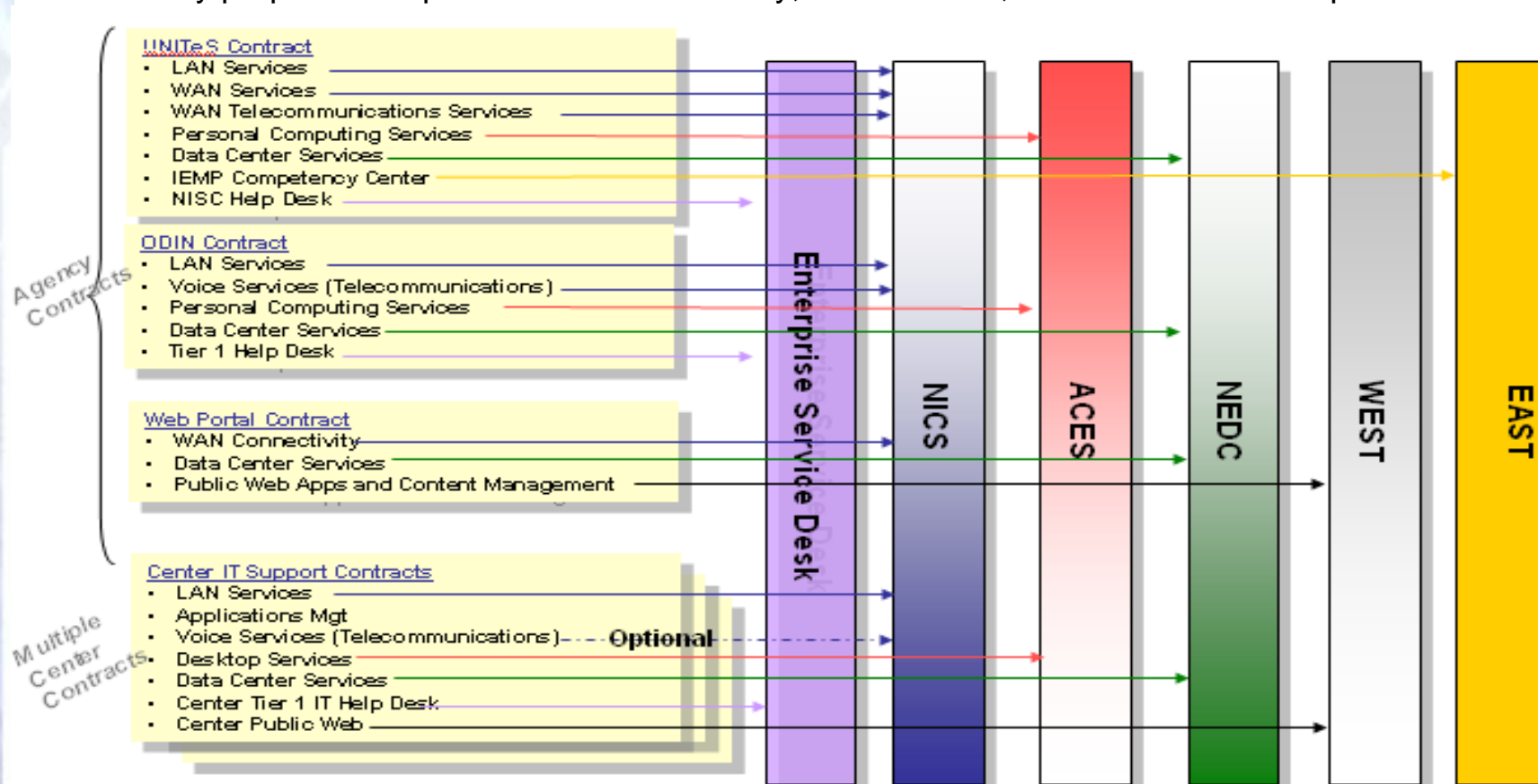
I³P Overview: Efforts Under Way

- Making NASA's information easier to discover and safely access through current projects (e.g., Security Ops Center)
- Continuing consolidation of NASA's information technology (IT) through current contracts and projects (e.g., ODIN, NOMAD)
- Working procurements for Agency-wide IT services:
  - **NICS** will integrate networks and provide seamless operations across Centers;
  - **NEDC** will improve availability and access to applications and data;
  - **WEST** will improve the quality of web services for the same cost;
  - **ACES** will provide a consistent level of IT services across NASA; and
  - **EAST** will enable more efficient development and maintenance of Agency-wide applications, as well as improve the availability of business information for better informed decision making.
  - Enterprise Service Desk at NSSC will provide a single point of contact for IT incident and problem resolution and I³P service ordering.

I³P Overview: Procurement Schedule

Updated April 20, 2009					
Milestones	**NICS**	**ACES**	**NEDC**	**WEST**	**EAST**
Draft RFP	4/20/09	4/20/09	4/20/09	4/20/09	5/11/09
Industry Days	4/21 and 4/22	4/21 and 4/22	4/21 and 4/22	4/21 and 4/22	4/21 and 4/22
Due Diligence	5/1 to 5/15 – Primary focus is on ACES, NEDC and NICS. NOTE: The EAST site visit will be on 5-20 at MSFC.				
RFP Release *	6/15/2009	6/15/2009	6/15/2009	6/15/2009	6/15/2009
Proposals Due *	7/30/2009	7/30/2009	7/30/2009	7/30/2009	7/30/2009
Contract Start *	May 2010	June 2010	May 2010	June 2010	May 2010

* Dates reflect current schedule posted online.

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Site Visit Objectives

- What we are planning to do
  - Explain the Center: facilities & people (who we are)
  - Explain involvement with major programs, projects, and missions (what we do)
  - Explain the current state of IT infrastructure at the Center
    - End-user services (desktop/laptop/workstations)
    - Communications (networks, phones)
    - Data centers

- What we are NOT planning to do
  - Explain further the five I^{3}P acquisitions or associated strategy
  - Explain the content of the draft RFPs
  - Entertain questions on the acquisition strategy or draft RFPs
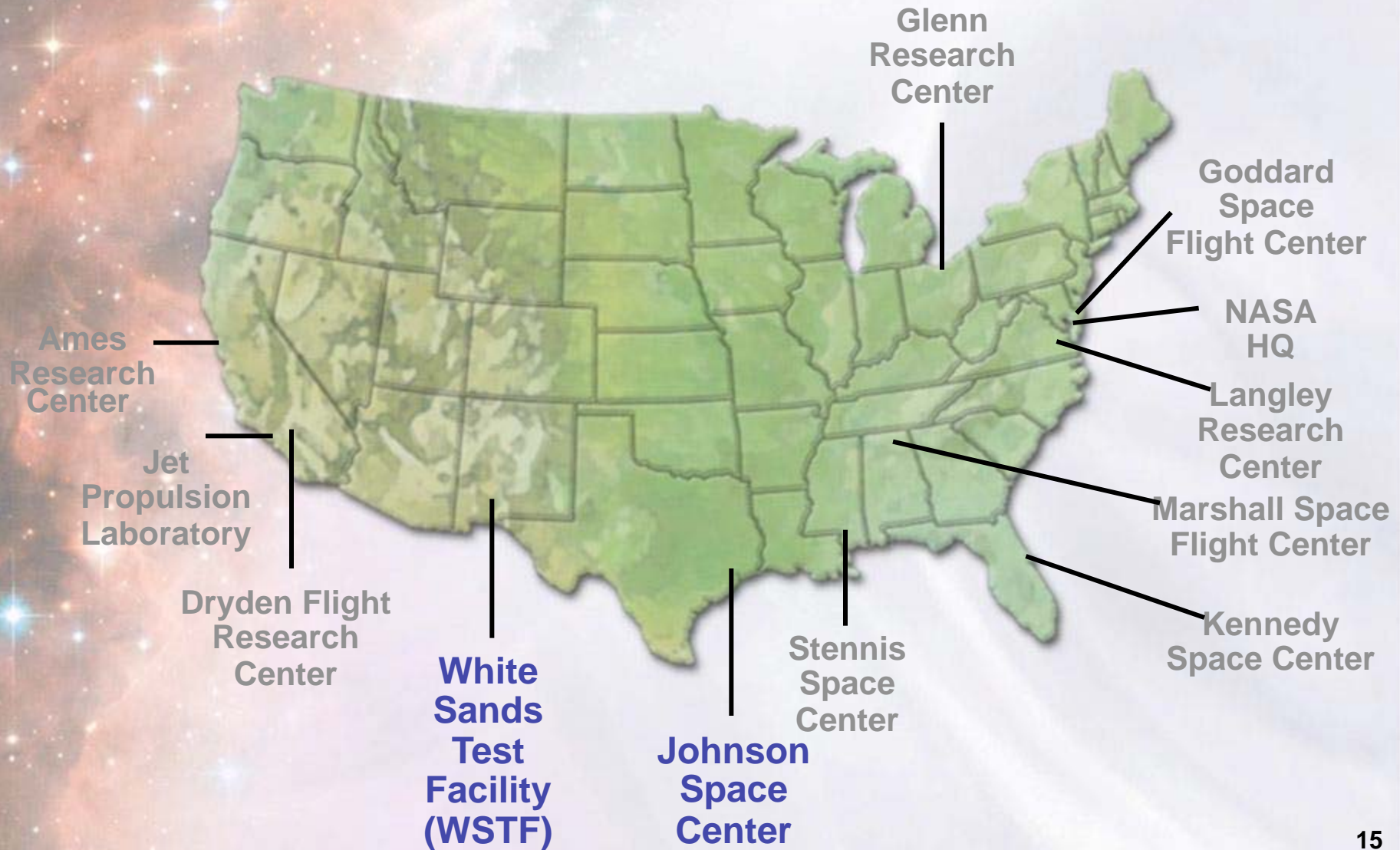 - Discuss future state/plans for Center IT infrastructure

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NASA

Johnson Space Center

An Overview:

Teamwork – Key to a Successful Space Program

Glenn Research Center

Goddard Space Flight Center

NASA HQ

Langley Research Center

Ames Research Center

Jet Propulsion Laboratory

Marshall Space Flight Center

Dryden Flight Research Center

Kennedy Space Center

White Sands Test Facility (WSTF)

Stennis Space Center

Johnson Space Center

Inside NASA - Johnson Space Center

Provide infrastructure and support services to three major programs in different phases of development – Space Shuttle, International Space Station and Constellation.

JSC manages the development, testing, production and delivery of all U.S. human spacecraft, and all human spacecraft-related functions.

Premier NASA Center for ISS and for human space flight related scientific and medical research efforts.

Inside NASA - Johnson Space Center

Workforce made up of over 3,200 civil servants and 13,000 contractors.

85% of JSC employees have a college degree and 30% have a graduate level degree.
In FY08, JSC managed a budget of $5.1B

Inside NASA - Johnson Space Center

JSC Facilities (Houston, TX):
- Onsite (including Ellington Field and Sonny Carter Training Facility) – 150 buildings
- Offsite – 26 contractor leased/owned buildings within 15 mile radius

WSTF Facilities (Las Cruces, NM):
- Onsite (including White Sands Space Harbor) – 51 buildings
- White Sands Complex (Goddard) - 5 buildings
- White Sands Missile Range (WSMR)/ Wallops Sounding Rocket Facility - 1 building
- White Sands Space Harbor is approx. 60 miles from WSTF - accessed through WSMR

El Paso Hanger and Forwarding Location

Core Competencies

Astronaut Selection & Training

Extravehicular Activities

Core Competencies

Mission Operations

Engineering

Core Competencies

Space Life Sciences

- Physiological countermeasures
- Environment, food, and nutrition
- Immunology, infection, and hematology
- Human behavior and performance
- Exercise physiology
- Radiation

Core Competencies

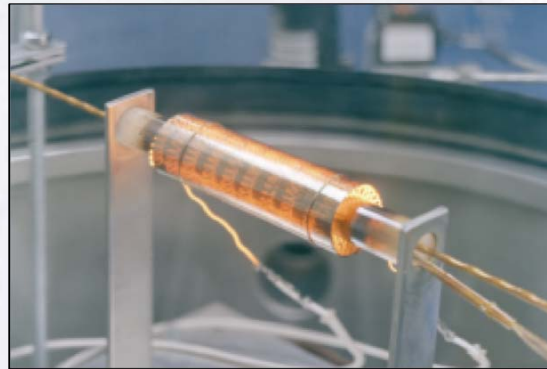Astromaterials Research and Exploration Science

Stardust

Genesis

Meteor

Core Competencies

White Sands Test Facility – Test & Evaluation

Core Competencies

Information Technology

Center IT Infrastructure Today

The JSC IT infrastructure supports many different environments both on and off-site

- Engineering and test facilities
- Mission control centers
- Scientific laboratories
- Office environments
- Warehousing and storage facilities
- Meeting, conferencing and auditorium facilities

Total number of ODIN seats at JSC: 43,000

The numbers included in this presentation are all estimates - a snap shot in time to explain the JSC environment. Companies must refer to the RFPs for the official numbers.

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Bob Neil – Chief, End User Services Office

JSC END USER ENVIRONMENT

Overview/Scope

- The Information Resources Directorate (IRD) is the organization responsible for providing institutional end user services at JSC & WSTF

- Institutional end user services are utilized by personnel in all JSC & WSTF organizations for office automation and scientific/ engineering tasks

- Mission critical end user services

  o IRD provides <u>institutional</u> end user services (e.g., phones, desktops, laptops, etc.) in mission critical facilities such as the Mission Control Center (MCC)

  o <u>Mission critical</u> end user services are not provided by IRD and are out of scope for these procurements.

End User Environment

International Space Station Mission Control Center

End User Environment

Mission Evaluation Room (MER)

End User Environment

End User service categories / providers

- Desktop computers / laptop computers / workstations – ODIN

- Shared Printers – ODIN

- Multi Function Devices – Agency Multifunction Device Contract

- Cell phones / Blackberry's – ODIN

- Pagers
  - o JSC – ODIN
  - o WSTF – WSTF pagers are provided by the Facility Operations Support Contract (FOSC). They are part of the WSTF safety alert system and are out of scope for this procurement.

End User Service Quantities

Type	JSC	WSTF
ODIN Desktop Seats (PC/Macintosh)	7227/70	462/0
ODIN Laptop Seats (PC/Macintosh)	3851/135	188/0
ODIN Workstation Seats (PC/Macintosh)	663/6	92/0
ODIN Shared Printers - Institutional	653	98
ODIN Shared Printers - PRN Seats	105	2
ODIN Shared Printers - Printers on LAN-C Seats	525	25
ODIN MC1 (Blackberry) Seats	1662	28
ODIN PCELL (Cell Phone) Seats	138	87
ODIN PG1/PG2/PG3 (Pager) Seats	529	0
Xerox Multi-Function Devices (MFD)	252	47

End User Environment

Current End User Service Standards (JSC & WSTF)

- ODIN Desktop/Laptop/Workstation Seats
  - Monitor – 17" LCD (Desktop seats), 19" LCD (Workstation seats)
  - Return To Service – by COB next business day
  - Hardware refresh - 3 years
  - Email – 400 MB mailbox
  - Home Directory – 50 MB
  - Help Desk support – weekdays – 6:00 AM – 6:00 PM
- ODIN MC1 (Blackberry) and PCELL (cell phone) Seats
  - Return To Service – within 8 work hours
  - Hardware refresh - 18 months
  - Help Desk support – weekdays – 6:00 AM – 6:00 PM
- Agency MFD's
  - Begin Repairs / Return To Service – within 4 work hours / within 20 work hours

End User Environment

Standard Software Load (JSC & WSTF) as of 5/1/09

- **PC/Windows**
  - Microsoft Windows XP SP3
  - Microsoft Office 2007 SP1
  - Internet Explorer 7
  - Symantec Anti-Virus 10.1.6.6010
  - Adobe Acrobat Reader – 9.1.0
  - Win-Zip 11.1
  - Timbuktu Pro 2000
  - QVT Term
  - WS-FTP pro 2007
  - JSC Emergency Notification System (JSC only)
  - JSC Systematic Recall & Emergency Notification System (SyREN) (JSC only)
  - Mozilla Firefox 3.0.8
  - .Net 1.1 SP1 / .Net 2.0 SP1
  - Entrust 7 (PKI)
  - QuickTime 7.5.5
  - Filenet eForms 4.2

End User Environment

Standard Software Load (JSC & WSTF) as of 5/1/09

- **Macintosh**
  - MacOS 10.5.6 Leopard
  - Microsoft Office 2008 SP1
  - Safari 3.2.1
  - Symantec Anti-Virus 10.2
  - Adobe Acrobat Reader – 9.1
  - Timbuktu Pro 8.7 (JSC only)
  - JSC Emergency Notification System
  - Mozilla Firefox 3.0.8
  - Entrust 7 (PKI)
  - QuickTime 7.5.5
  - X11 v1.3.0
  - Filenet eForms 4.2

Kristin Ingram – Chief, Communication Systems Office

COMMUNICATION ENVIRONMENT

Communication Environment
Data Network and Firewall Systems

- The JSC Institutional Network System (INS) is used by NASA employees for office automation functions (i.e. email, printing and file sharing)
  - Provides access to other NASA Centers and to the Internet
  - Services are also provided at White Sands Test Facility, Sonny Carter Training Facility and Ellington Field
  - Available 24/7

- Mission critical network services in facilities such as in the Mission Control Center are **<u>not</u>** provided by IRD and are out of scope for these procurements
  - IRD does provide institutional network services in many of these facilities, for office automation purposes only

Communication Environment
Data Network and Firewall Systems

JSC INS Design

- Designed as a Core/Distribution/Access network
- Primary Core/Distribution networking hub is located in B46
- Secondary Core/Distribution networking hub is located in B17
  - The secondary location ensures there is no loss of core networking functionality in case of failure of the primary
- Cisco is the primary routing and switching hardware vendor
  - Aruba Networks is the vendor for Wireless access points
- JSC network supports over 16,000 users
  - This includes both onsite and off-site users

Cable Plant

- Three Main Fiber Hubs in buildings 17/46/32A provide fiber connectivity to JSC buildings
  - Inter-building fiber is single mode
  - JSC has a tunnel system that carries most of the inter-building fiber
- Intra-building fiber is mostly single mode, although multi mode is still used in some buildings
- Copper Cabling includes both Cat5e and Cat6e
  - All copper cabling installed and tested per existing regulations

Communication Environment

Tunnel Infrastructure

Fiber Rack in B17

Communication Environment
Data Network and Firewall Systems

Relevant Network Information (JSC/WSTF)

- Gigabit Ethernet Core
- Multicast Enabled
- Quality of Service Enabled
- Voice over Internet Protocol (VoIP)
- JSC/WSTF Total Active network ports – over 20,000
- JSC/WSTF Total VoIP ports – over 300

Communication Environment

Data Network and Firewall Systems

Relevant Network Information (JSC/WSTF)

- JSC
  - Routers 40
  - Switches 600
  - Wireless Access Points 300
  - Wireless Bridge Links 14
- WSTF
  - Routers 6
  - Switches 40
  - Wireless Access Points 50
  - Wireless Bridge Links 4

Building 30 Router

Communication Environment
Data Network and Firewall Systems

- Virtual Private Network (VPN)
  - JSC/WSTF supports two VPN systems
    - Microsoft Point to Point Tunneling Protocol (PPTP)
    - Juniper Secure Socket Layer (SSL)
      - Built with a fault tolerant redundant design

- JSC Firewall System
  - Juniper Netscreen Firewall Devices
    - Fault tolerant, geographically separated redundant design
    - Zoned Architecture
      - Outer Firewall separating public and JSC contractor network (ISOLAN)
      - Inner Firewall separating ISOLAN and JSC private network
      - DMZ firewall for segregation of public facing systems and services
    - Rule base consists of approximately 950 rules
    - WSTF has Checkpoint Firewalls currently; migrating to Juniper Firewalls
  - Blue Coat provides the web proxy and web-filtering services for the JSC and WSTF private networks

Communication Environment
Voice Systems

- The Center Telecommunications System (CTS) provides traditional PBX based telephone capability
  - Used by most of JSC, Ellington, and Sonny Carter
  - Includes local phone service, long distance service, and 5 digit dialing for onsite phone users
- Other capabilities include:
  - Caller ID
  - Operator assistance
  - Emergency locator information
  - Voice mail service with password control
  - Data service: inward and outward dialing from modem equipped computers and facsimile machines attached to analog subscriber lines
- WSTF capabilities are similar

Communication Environment

Voice Systems

CTS Architectural Overview

- CTS hub is Building 17, Room 134 (approx 1500 sq. ft)
  - Contains the host Siemens "EWSD" switch and voice mail system along with the Main Distribution Frame (MDF) connecting to Public Switch Telephone Network trunks, and to the Satellite Distribution Frames (SDF) at the remote switch unit locations
  - EWSD stands for "*E*lektronisches *W*ähl*s*ystem *D*igital", or Electronic World Switch Digital in English.
  - Also contains the CTS spares inventory
- The host and three remote switching units serve over 13,000 digital and 2,700 analog subscriber lines located throughout the JSC complex, including Ellington and Sonny Carter
- Voice traffic to other NASA and government locations as well as long distance service is handled by the Networx contract

Communication Environment

Voice Systems

JSC Remote Switch Units

- Building 30A is linked to the Building 17 facility through copper backbone cable

- Ellington Field - located in building E260 - remote switch unit is connected to the JSC EWSD host via AT&T provided lines

- Sonny Carter Training Facility (SCTF) - remote switch unit is connected to the JSC EWSD host via AT&T provided lines

JSC CTS Photos

Ellington Phone Switch

B17 Phone Switch

B30 Phone Switch

WSTF CTS Architectural Overview

- Comprises three nodes residing in B101 (Node 1), B200N Hibay (Node 2) and White Sands Space Harbor (Node 3)

- Each node is a Nortel CS1000 Option 81 Switch

- Node 1 location also includes the WSTF voice mail system

- All nodes are interconnected via T1 lines

- WSTF CTS has over 1900 digital and analog subscriber lines located through the WSTF complex, including the White Sands Space Harbor (WSSH)

- Voice traffic to other NASA and Government locations is carried by the Networx contract

Communication Environment

Voice Systems

Voice over IP (VoIP) Scope

- JSC has a small production deployment of Cisco VoIP technology (approx. 300 phones at JSC; 10 at WSTF)

- Any areas of the JSC campus that are refurbished or new construction will be outfitted with VoIP telephones

- VoIP system can accommodate 1000 phones with the equipment we have currently

- JSC uses Quality of Service (QoS) to prioritize voice traffic on the network, specifically, Cisco's AutoQoS technology

Communication Environment
Voice Systems

VoIP General Design

- VoIP system uses the same IP network as that used for data traffic

- VoIP system uses the same 5 digit dialing as the Center Telecommunications System (CTS)

- There are no plans for Unified Messaging services at this time

- The VoIP System uses a separate voice Virtual Local Area Network (VLAN) for voice traffic

- All locations with VoIP have Uninterruptible Power Supplies attached

- VoIP emergency locator information uses the same system as the CTS

Audio & Video Teleconferencing

- Available for use by the entire center population
- Many of the rooms are particular to a specific organization. Others are open to scheduling by anyone at the Center.
- Teleconferencing room systems are used to support
  – business meetings between Centers
  – meetings with other Government agencies
  – inter-center mission support reviews
  – meetings with the ISS International partners and non-Government entities working with NASA (e.g. universities)
- In addition to video, there are a number of rooms equipped for audio-conferencing only

Audio and Video Conferencing Locations

- JSC
  - Sixteen (16) ISDN based conferencing rooms
  - Seven (7) IP based conferencing systems using Lifesize technology
  - Seventeen (17) audio only systems
  - Not all of these are large-scale conferencing rooms - some are no more than team/huddle rooms

- WSTF
  - Two (2) ISDN based rooms
  - One (1) IP based system
  - Four (4) audio teleconferencing equipped rooms

Architectural Overview

- ISDN-based room systems utilize COTS teleconferencing components (e.g. Sony, Polycom)
  - Larger ISDN-based rooms use multiple cameras and interfaces to display computer graphics
  - Video teleconferencing components are connected for operation by using a room control system (e.g. AMX)
- IP-based rooms use Lifesize technology for video-teleconferencing capabilities
  - Lifesize is a technology which makes use of High Definition video coupled with an advanced audio system that provides for a very natural interaction
- The audio systems are COTS products (e.g. Shure, Polycom) that utilize the Center's phone system

Communication Environment

B17 Videoconference Room

Lynn Vernon – Chief, Applications and Data Systems Office

DATA CENTER ENVIRONMENT

Data Center – General Information

- JSC's Data Center is housed in Building 46 on the 3rd and 2nd floors
  - Originally constructed in 1988 to host JSC mainframes
- Data Center is equipped with a Proximity Card reader system.
  - System divided into five security zones
- Cooling capability rated at 300 tons per floor
  - 16 Air Handlers on the 3rd floor, and 14 on the 2nd
  - Each Air handler rated at 20 tons
- Electrical capacity of 1000 KVA
  - 1000 KVA (850 usable) of UPS power in 4 isolated systems
  - Current usage is approximately 40% of capacity

Data Center – General Information

- WSTF's Data Center is located in Building 101, Rm 210

- Protected by electronic keypad entry

- 2 Pamona Air Handlers, replacing with new units providing more cooling capacity and redundancy

- Electrical capacity is 85 KVA (40 usable) of UPS power utilized to transition power to 200 KVA Generator. Increasing electrical capacity to 500 KVA.

- Available space for approximately 1000 servers

- Potential use as contingency site for Agency/JSC requirements

Data Center - Hosting Information

- Number of seats at JSC
  - File1 seats: 144
  - App seats: 128
  - Web seats: 119
- 2nd & 3rd floors (approx 28,000 sq ft.) are used or could be used to host operations
- 3rd floor (approx 16,000 sq. ft.) hosts about 800 servers
  - Institutional Servers
    - IRD, Engineering, Center Operations, Mission Operations, Human Resources, Space Life Sciences
  - Program Servers
    - Space Station, Shuttle, Extra Vehicular Activity
  - Warm Site for Stennis Space Center
  - Agency Servers
    - NOMAD, NASA Data Center (NDC)

Data Center – Hosting Info (cont'd)

B46 2nd floor (approx 12,000 sq ft of usable space)

- Flight Equipment Interface Device (FEID) – used for testing flight software, considered a National Resource (out of scope of these procurements)
- Potential use as a disaster recovery cold site for MSFC NASA Data Center (NDC)
- IRD LAB – testing, prototyping, and development of new systems
- Staging area for new equipment – used for the unpacking, setup, and testing for production replacement systems
- Network Control Center (NCC) – monitor the health and status of the JSC network

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Center Tour

- Tours of JSC will leave Space Center Houston (SCH) parking lot at 12:30 & 1:00 pm

- Please arrive at the SCH parking lot 15 minutes prior to your tour time for boarding

- Must show your govt issued, picture ID to receive Special Event badge

- Tours will include Data Center and Network Control Center in B46 and Communications Center in B17

- Please bring bottled water, umbrella

- Inclement weather: Tour will be cancelled if there is lightning; call 281.483.2424 or 281.483.3791 for recorded weather status